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CONTROL OF THE WHITE-PINE WEEVIL WITH INSECTICIDAL EMULSIONS

Excellent control of the white-pine weevil in young white pine plantations, by applying concentrated lead arsenate spray with knapsack sprayers, was demonstrated and reported several years ago.¹ Since then, research has shown that a number of newer insecticides, used as emulsions, are also very effective.

Emulsions have the following advantages: (1) they are easy to prepare and apply, (2) they offer a wide range of materials that are not injurious to the trees, (3) they can be effective against other insects such as the pine bark aphid, (4) their costs are relatively low, and (5) it is possible to lengthen their period of effectiveness considerably by the use of an extender.

Replicated tests under conditions of heavy weevil populations have proved the following emulsions completely satisfactory for use in March and April: (1) DDT at 1 percent; (2) heptachlor, 1 percent; (3) heptachlor plus extender, $\frac{1}{2}$ percent; (4) lindane plus extender, $\frac{1}{4}$ percent; and (5) malathion plus extender, $1\frac{1}{2}$ percent. (Endrin was also tested, and it proved effective for killing white-pine weevils. However, it cannot be recommended for general use because it is extremely toxic to wildlife.)

¹Crosby, David. How to control the white-pine weevil with a hand sprayer. Northeast. Forest Expt. Sta. Forest Res. Note 30. 3 pp. 1954.

Fall applications in late October, using lindane plus the extender at 2, 1, and $\frac{1}{2}$ percent, resulted in only 1 weeviled leader out of 10,000 trees sprayed. Fall treatments with 3- to 5-percent emulsions of heptachlor, plus the extender, also appeared very promising.

Spray Materials

Insecticides.--The formulations recommended are prepared from the following emulsifiable concentrates: (1) DDT, 25 percent; (2) lindane, 20 percent; (3) heptachlor, 25 percent; and (4) malathion, 57 percent. Simply add water to the concentrate or to the concentrate plus the extender. (See Table 1 for proportions.)

Extender.--Aroclor 5460² is available in rosin-like form from Monsanto Chemical Co. A 75-percent stock solution is prepared by dissolving 1 pound of Aroclor 5460 in 1 pint of technical grade xylene. Thus far, this solution has been used in equal part by weight with each insecticide.

Equipment

Sprayer.--A wide range of equipment, from simple hand sprayers to 5-gallon knapsack sprayers, is available for applying these emulsions. The cylindrical 2- or 3-gallon compressed-air garden sprayer is satisfactory for small tree applications, easy to use, and relatively low in cost.

Nozzle.--For proper economy of materials, only very fine nozzle openings should be used. The "1-S" nozzle recommended for lead arsenate is quite satisfactory, but many other nozzles will suffice. Under general field conditions, the nozzle delivery rate should be 1 to 2 gallons per hour.

Spray Rod.--A light tubular rod about 4-feet long will handle conveniently all trees up to 10 feet in height. A 90° elbow on the nozzle end is highly desirable.

Strainer.--To avoid clogging, all materials put into the sprayer should be strained through either fine metal

²Mention of commercial products is not to be construed as endorsement of them by the Forest Service or Department of Agriculture.

cloth (about 40 mesh), or several thicknesses of cheesecloth.

Measures.--For preparing the emulsions, you will probably need the following liquid measures: 1-gallon, 1-quart, and 1-pint graduated in ounces.

How To Spray

The upper half of each leader should be sprayed to the run-off point by holding the nozzle 1 to 4 inches from the leader. Spray the leader from opposite sides to insure proper coverage.

When To Spray

Spraying may be done in March and April or in the fall, depending on the material used. Spring spraying should be completed by late April or early May before the adult weevils commence feeding.

Recommended Sprays

Emulsions now recommended are given in Table 1. Formulations numbered 1 to 5 are for spring treatments; and 6 to 7 for fall treatments. These recommendations are tentative and may ultimately be changed.

Of the formulations in Table 1, some preference may be given lindane because of its low cost and malathion for its low toxicity to mammals.

Selective Spraying Or Partial Treatment Of Stand

Protecting a stand of young white pines with hand equipment can be accomplished with less expenditure of time and money if only the well-formed vigorous trees are sprayed. However, when only part of the stand is sprayed, it is essential that the stand be examined by mid-July and any weeviled leaders removed and destroyed. This partial treatment will reduce the chances of weeviling even on the untreated trees. Tests conducted over the past 3 years indicate that the degree of weeviling of the untreated trees will be less than one-fourth that in comparable check areas. Weeviling on the sprayed trees has in all cases been less than $\frac{1}{2}$ percent.

Table 1.--Recommended emulsion sprays for control of white-pine weevil

Spray No.	Formulation	Commercial concentrate	To make 1 gallon, use--			Cost per gallon*
			Concentrate	Extender	Water	
		Per cent	Fluid oz.	Fluid oz.		
1	DDT, 2%	25.0	10.2	--		\$0.34
2	Heptachlor, 2%	25.0	10.2	--		.40
3	Heptachlor, 1% - A**	25.0	5.2	1.7		.26
4	Lindane, ½ % - A**	20.0	3.2	.9		.23
5	Malathion, 2% - A**	57.0	4.5	3.4		.41
6	Heptachlor, 4% - A**	25.0	20.5	6.8		.98
7	Lindane, 1% - A**	20.0	6.4	1.7	Add as much water as needed to make 1 gallon of emulsion	.46

*Based on 1957 retail costs.

**Equal parts by weight of Aroclor 5460 and insecticide.

Many more trees can be sprayed per gallon and per hour by selecting only the good trees for treatment. In plantations 3 to 8 feet in height the following may be expected: (a) spraying all trees--320 per gallon and 450 per hour; (b) spraying only good trees--450 per gallon and 650 per hour. The combined costs of spraying only the good trees plus the removal of weeviled leaders in mid-July should be 75 percent or less of the cost of initially spraying all the trees in the plantation.

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